

# **OUTCOME OF PLATING AND INTRAMEDULLARY FIXATION OF DISPLACED MIDSHAFT CLAVICLE FRACTURES: A SEARCH FOR THE OPTIMAL SURGICAL MANAGEMENT**

## **Abstract of the Study:**

Clavicle fractures account for 2-5% of all fractures in adults. Historically general consensus was that vast majority of clavicle fractures heal well without operative intervention. Other than traditional indications for surgical intervention such as neurovascular compromise and open fractures, operative management remained somewhat controversial and quite often it still forms an ongoing topic of debate. But recent studies point out that an exception should be made for the subgroup of patients with displaced fractures of middle third of the clavicle. Reported patient outcome improve following operative reduction and fixation and the risk of malunions and nonunions is significantly reduced. Main objective of this thesis is to directly compare open reduction and internal plate fixation with closed reduction and intramedullary fixation using a nail in favour of rate of recovery and scapulothoracic kinematics following clavicle fractures.

## **Introduction:**

Approximately 2-5% of all fractures in adults and 10-15% in involve the clavicle. The incidence of this type of fracture in the adolescent and adult population is reportedly 29-64 per 100,000 annually. Fractures of the clavicle also demonstrate a bimodal age distribution. Young males who are less than 30 years old and elderly patients over the age of 70 appear to be two distinct age groups at higher risk for clavicle fractures.

In adults more than two thirds of these injuries occur at the diaphysis of the clavicle and are more likely to be displaced as compared to medial and lateral third fractures. Lateral third fractures are less common, accounting for approximately 25% of all clavicle fractures and are less likely to be displaced than those occurring in the midshaft. Medial third fractures comprise the remaining 2-3% of these injuries.

Traditionally nonsurgical management has been favoured as the initial treatment modality for most clavicle fractures because of the high non-union rates reported following treatment. Although nonsurgical management may be optimal for many clavicle fractures, good outcomes of nonsurgically treated fractures are not universal. Recent evidence suggests that specific subsets of patients may be at high risk for non-union, shoulder dysfunction or residual pain after nonsurgical management.

In this subset of patients acute surgical intervention may minimize suboptimal outcomes. Therefore specific treatment of clavicle fractures should not be broadly applied, but rather individualized based on fracture characteristics and patient expectations.

The purpose of this thesis is to compare the outcome after plate and intramedullary fixation of displaced midshaft clavicle fractures.

Our institution being a referral unit we are receiving many closed displaced middle third fracture clavicle. Hence it is necessary to compare surgical techniques using open reduction and internal plate fixation with closed reduction and intramedullary fixation using a nail in terms of rate of malunions, nonunions, rate of recovery, shoulder dysfunction and residual pain.

## **METHODS & MATERIALS:**

### **Sample Size:**

30 Cases (15 cases for ORIF with plating, 15 cases for Closed Reduction & Intramedullary Nailing).

### **Period of Study:**

6 Months (Aug 2014 to May 2015)

### **Follow-up Period:**

3-6 Months (12-24 Weeks)

### **Indication for Internal Fixation:**

- 1) Unstable fractures
- 2) Open fractures
- 3) Neurovascular injury
- 4) Floating shoulder
- 5) Symptomatic non-union
- 6) Displaced Group I > 2cm shortening

**Advantages of Plating:**

- 1) Comminuted fractures – Lagging possible
- 2) No need for implant removal
- 3) Symptomatic non-union – Bone grafting possible

**Disadvantages of Plating:**

- 1) Cosmetically inferior
- 2) Chance of infection
- 3) Disturbing fracture hematoma

**Advantages of IM Nailing:**

- 1) Minimally invasive
- 2) Cosmetically superior
- 3) Intramedullary fixation (Endosteal Callus)

**Disadvantages of IM Nailing:**

- 1) Not suitable for comminuted fractures
- 2) Skin irritation and pain
- 3) Need for implant removal

**Inclusion Criteria:**

Patients aged more than 17 years irrespective of sex with closed displaced midshaft clavicle fractures (DMCF).

**Exclusion Criteria:**

- Patients aged less than 17 years
- Patients on drugs that affect bone metabolism
- Patients who have pre-existing malignancies
- Patients who have metabolic disorders

**AIMS:**

- 1) To study the objective and subjective results of comparing plate fixation and intramedullary fixation of DMCF and to study the Surgical Therapeutic Index as an indicator of benefits and risks of surgical trauma care
- 2) To study the scapulothoracic kinematics of patients after surgical fixation of DMCF

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பங்கு பெறுபவரின் ஒப்பம்

ஆராய்ச்சின் தலைப்பு : கழத்துப்பட்டை எனும் பிறகு பிளேட் 1 Plate)  
மற்றும் கம்பி (Nail) வைத்து செய்யும் அறுவை  
சிகிச்சையை ஒப்பிடுதல்

ஆராய்ச்சி நடைபெறும் இடம்: அரசு ஸ்டான்லி மருத்துவக்கல்லூரி,  
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பங்கு பெறுபவரின் பெயரும், முகவரியும் :

நான் ..... இந்த ஆராய்ச்சியின் விவரங்களை எனது  
சொந்த மொழியில் கூற அறிந்து கொண்டேன்.

இந்த ஆராய்ச்சியின் முழு விவரங்களையும் நான் அறிந்த கொண்டேன்.  
இந்த ஆராய்ச்சியின் நான் பங்கு பெறும் போது எனக்கு ஏற்படும் நன்மை  
தீமைகளை முழுவதுமாக அறிந்து கொண்டேன்.

இந்த ஆராய்ச்சியின் போது எப்போது வேண்டுமானாலும் நான் விலகி  
கொள்ளலாம் என்பதையும் அதனால் எனக்கு கிடைக்கும் மருத்துவத்தில் எந்தவித  
மாற்றமோ, பாதிப்போ இருக்காது என்றும் அறிவேன். இந்த ஆராய்ச்சியின்  
நான் பங்கு பெறுவதற்காக நான் எந்தவித சன்மானமும் (பணமாகவோ,  
பொருளாகவோ) வாங்கமாட்டேன். இந்த ஆராய்ச்சியில் எனக்கு எந்த  
ஆட்சேபனையும் இல்லை. இந்த ஆராய்ச்சியில் என் பங்கு என்ன என்பதை  
அறிவேன். இந்த ஆராய்ச்சிக்கு எனது முழு ஒத்துழைப்பையும் தருவேன் என்று  
உறுதி அளிக்கிறேன்.

பங்கு பெறுபவரின் கையொப்பம் / விரல் ரேகை

தேதி :

சாட்சி :

(சாட்சி பெயர், முகவரி, கையொப்பத்துடன்)

ஆராய்ச்சி செய்பவரின் பெயரும் கையொப்பமும்

## PROFORMA

S.No :

Patient Name:

IP No:

Age/ Sex:

Occupation:

Address:

Phone no:

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Date of injury:

Date of Discharge:

Mode of injury:

Side: R/ L

Fracture type: **Allman's Group 1 fractures**

Associated injuries:

Time duration between Injury & Surgery:

Plating/Nailing:

Mobilization started on:

Time for union:

Complications:

Maximum Score:

Maximum adjusted score:



## **The Disabilities of the Arm Shoulder and Hand (DASH) Symptom Scale**

**Overview:** The Disabilities of the Arm Shoulder and Hand (DASH) symptom scale can be used to evaluate a patient with a disorder of the upper extremity. It can be used to monitor the patient over time and to determine the effectiveness of an intervention.

### **Measures:**

- (1) Opening a tight or new jar
- (2) Writing
- (3) Turning a key
- (4) Preparing a meal
- (5) Pushing open a heavy door
- (6) Placing an object on a shelf above the head
- (7) Doing heavy household chores
- (8) Gardening or doing yard work
- (9) Making a bed
- (10) Carrying a shopping bag or briefcase
- (11) Carrying a heavy object (over 5 kilograms)
- (12) Changing a light bulb overhead

- (13) Washing or blowing drying the hair
- (14) Washing the back
- (15) Putting on a pullover sweater
- (16) Using a knife to cut food
- (17) Recreational activities that require little effort
- (18) Recreational activities that require taking some force or impact through the arm shoulder or hand
- (19) Recreational activities that require moving the arm freely
- (20) Managing transportation needs (getting from one place to another)
- (21) Sexual activities
- (22) Social activities
- (23) Work and other daily activities
- (24) Pain
- (25) pain when performing activities
- (26) Tingling
- (27) Weakness
- (28) Stiffness
- (29) Difficulty in sleeping
- (30) impact on self-image

<b>Response</b>	<b>Points</b>
No difficulty or no symptom	0
Slight difficulty or mild symptom	1
Moderate difficulty or symptom	2
Severe difficulty or symptom	3
Unable to perform or very severe symptom	4

where:

- Pain (item 24) may refer to pain at rest.
- Alternatively the points may be assigned from 1 to 5.

total score = SUM(points for all 30 items)

adjusted score (if scored from 0 to 4) = (total score for patient) / 120 \* 100

**Interpretation:**

- minimum score (using 0 to 4 scale): 0
- maximum score (using 0 to 4 scale): 120
- minimum adjusted score: 0
- maximum adjusted score: 100

Adjusted Score	Disability Level
0	No disability
100	Extreme disability

## RESULTS

<b>RESULTS</b>	<b>PLATING (15)</b>	<b>ELASTIC NAIL (15)</b>
Union in anatomical position	15	15
Union in 12 weeks	11	14
Union in 16 weeks	4	1
Nonunion	Nil	Nil
Malunion	Nil	Nil
Early return to activity	28 days (11 cases)	14 days (14 cases)
Stiffness of shoulder	3	Nil
Loss of length of clavicle (shortening > 2cms)	Nil	Nil
Patient compliance and functional outcome	Excellent-8 cases Good-4 cases Moderate-3 cases Poor-Nil	Excellent-12 cases Good- 2 cases Moderate-1 case Poor-Nil
Other Complications	Infection-2 cases Stiffness of shoulder-3 Hypertrophied Scar-3	Nail migration-1 case Skin irritation-2 cases Infection-Nil

## CONCLUSION

Even though increased popularity of surgical methods most of the clavicle fractures managed by conservative methods till now. Nonsurgical methods are nowadays used in elderly patients with less physiological demand. But increasing evidence of good functional outcome of surgical methods favors fixation for young individuals and elderly patients with physiological demand. Good anatomical reduction for comminuted fractures and no need for implant exit are merits of plating. But surgical scar and chances of infection are more in plating. Intramedullary fixation, minimally invasive and early mobilization are the merits of elastic nailing. But need for implant exit and inadequate fixation for comminuted fractures are demerits of nailing.

**In conclusion titanium elastic nail size of 2 – 2.5mm diameter is recommended for displaced midshaft clavicle fractures. When compared to plating, nailing has excellent functional outcome and minimal complications.**

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